Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Fair

Cahulga Creek at Cleburne County Road 9 (33.63912/-85.60759)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Cahulga Creek watershed for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group.

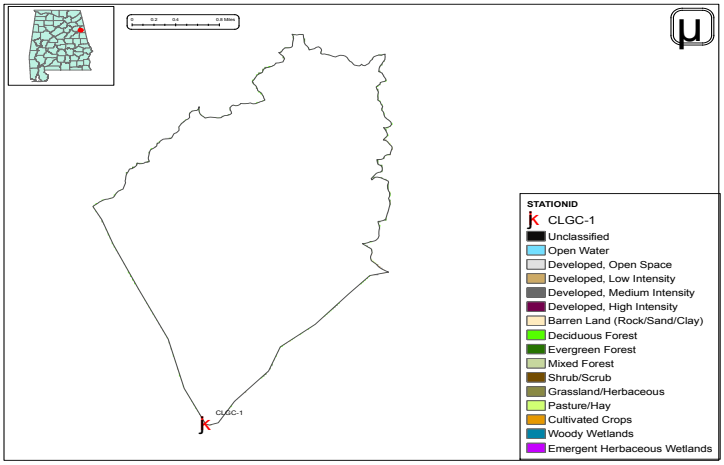

Figure 1. Sampling location and landuse within the Cahulga Creek watershed at CLGC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cahulga Creek is a small *Fish & Wildlife (F&W)* stream located near the city of Heflin.This watershed falls within the Talladega Upland ecoregion, usually characterized by moderate to high gradient streams with bedrock, boulder, cobble, gravel and sand substrates. Landuse within the watershed is primarily forest (90%), (Fig. 1).

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Cahulga Creek at CLGC-1 is a low-gradient, sand-bottomed stream in the Coosa River basin. Overall habitat quality was categorized as *marginal* due to sedimentation, bank erosion, and a lack of stable in-stream habitat.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		7
Ecoregion[a]		45d
% Landuse		
Open water		2
Wetland	Woody	<1
Forest	Deciduous	61
	Evergreen	29
	Mixed	<1
Shrub/scrub		<1
Grassland/herbaceous		2
Pasture/hay		2
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km^2[b]		16
# NPDES Permits[c]	**TOTAL**	1
Municipal Individual		1

a. Talladega Upland
b. 2000 US Census data
c. #NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics at CLGC-1, May 5, 2005.

Physical Characteristics		
Width (ft)		25
Canopy cover		Mostly Shaded
Depth (ft)		
	Run	1.5
	Pool	3.5
% of Reach		
	Run	20
	Pool	80
% Substrate		
	Cobble	2
	Gravel	13
	Sand	65
	Silt	15
	Organic Matter	5

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is an average of the score for each metric. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 3. Results of the habitat assessment conducted at CLGC-1, May 5, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	56	Marginal (41-58)
Sediment deposition	40	Poor (<41)
Sinuosity	28	Poor (<45)
Bank and vegetative stability	45	Marginal (35-59)
Riparian buffer	50	Marginal (50-69)
Habitat assessment score	111	
% Maximum score	**50**	**Marginal (41-58)**

Table 4. Results of the macroinvertebrate bioassessment conducted in CLGC-1, May 5, 2005.

Macroinvertebrate Assessment			
	Results	**Scores**	**Rating**
Taxa richness measures			
# EPT genera	13	52	Fair (37-56)
Taxonomic composition measures			
% Non-insect taxa	12	65	Fair (61.8-92.7)
% Plecoptera	1	7	Good (5.6-52.8)
% Dominant taxa	22	69	Fair (47.0-70.5)
Functional composition measures			
% Predators	11	5	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	12	55	Good (31.8-65.9)
% Nutrient tolerant organisms	43	45	Poor (25.4-50.8)
WMB-I Assessment Score	**---**	**43**	**Fair (37-56)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Hardness and nitrate+nitrite nitrogen concentrations were above values expected in this ecoregion. The site did not exceed numeric criteria for metals. However, total aluminum, total iron, and dissolved manganese concentrations were also higher than expected in this ecoregion.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Results of a habitat assessment and intensive water quality sampling suggest habitat degradation to be a potential source of the degraded biological condition. Higher than expected metals concentrations were also a concern.

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Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	7	15.0	26.5	25.0	21.9	5.1
Turbidity (NTU)	7	6.4	124.0	9.1	26.5	43.2
Total Dissolved Solids (mg/L)	7	20.0	41.0	36.0	34.4	7.3
Total Suspended Solids (mg/L)	7	10.0	172.0	17.0	38.1	59.2
Specific Conductance (µmhos)	7	38.6	55.1	46.1	47.1	5.6
Hardness (mg/L)	5	10.5	20.2	15.7M	16.0	3.9
Alkalinity (mg/L)	7	11.8	22.2	14.7	16.1	3.7
Stream Flow (cfs)	7	6.7	66.7	29.7	29.5	---
Chemical						
Dissolved Oxygen (mg/L)	7	6.2	9.6	7.5	8.0	1.4
pH (su)	7	6.8	7.2	6.9	7.0	0.2
Ammonia Nitrogen (mg/L)	7	< 0.015	0.025	0.008	0.013	0.007
Nitrate+Nitrite Nitrogen (mg/L)	7	0.063	0.133	0.090M	0.090	0.023
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.303	0.075	0.126	0.092
Total Nitrogen (mg/L)	7	0.110	0.343	0.123	0.176	0.094
Dissolved Reactive Phosphorus (mg/L)	7	0.005	0.015	0.008	0.008	0.003
Total Phosphorus (mg/L)	7	0.015	0.132	0.049	0.058	0.036
CBOD-5 (mg/L)	7	< 1.0	3.2	2.1	2.0	1.2
J Chlorides (mg/L)	6	3.5	6.8	4.2	4.5	1.2
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.156	0.015	0.048	0.072
Iron (mg/L)	4	0.564	1.11	0.903M	0.870	0.234
Manganese (mg/L)	4	0.041	0.103	0.086M	0.079	0.028
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.095	0.008	0.029	0.044
Antimony (µg/L)	4	< 2	< 2	1	1	0
Arsenic (µg/L)	3	< 10	< 10	5	5	0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	4	0.195	0.31	0.244	0.248	0.060
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	0.026	0.074	0.062M	0.056	0.021
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.00
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.000
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
J Chlorophyll a (mg/L)	7	0.10	4.63	1.42	1.80	1.4
J Fecal Coliform (col/100 mL)	7	37	1000	160	280	344

J=estimate; N=# samples; M=value > 90th percentile of all data collected within ecoregion 45d